

burner assembly is firing in any range of its total capacity. It is further contemplated that the atomizing nozzle of the preferred coal burner assembly may be adapted to receive more or less than a relatively small amount of gaseous fuel over the entire range of operation of the burner assembly.

[0032] Still referring to FIG. 4, the preferred coal burner assembly 20 includes a pair of screens 80 and 82. The preferred screens 80 and 82 are mounted in the housing of the burner assembly downstream from the impeller and adapted to straighten air flow in the coal burner assembly. While FIG. 4 illustrates the preferred coal burner assembly 20 having two screens, it is contemplated within the scope of the invention that the coal burner assembly may have more or fewer than two screens, and that the screen(s) may be of any suitable configuration and arrangement. It is also contemplated within the scope of the invention that the preferred coal burner assembly may include a straightening screen adapted to produce a uniform air flow velocity in the burner assembly and/or a mixing screen adapted to produce a uniform air flow velocity in the burner assembly and mix combustion air and fuel in the burner assembly.

[0033] Referring now to FIG. 5, a partial sectional perspective view of the preferred burner end 24 of coal burner assembly 20 is illustrated. As shown in FIG. 5, the preferred coal burner assembly 20 includes first bluff body ring 32, second bluff body ring 34, third bluff body ring 35, flame bridges 36, gas injection nozzles 38, atomizing nozzle 39, flame retention cone 52, cylindrical portion 54 and jog 55. As also shown in FIG. 5, the preferred coal burner assembly 20 includes coal tube band 90. The preferred coal tube band 90 is disposed on the inner diameter of coal tube 60 in burner end 24 and adapted to improve the stability and quality of the liquid fuel flame. More particularly, the preferred coal tube band 90 is adapted to produce an eddy downstream from the band. The preferred coal tube band 90 is an approximately  $\frac{3}{8}$ " smooth ring, but it is contemplated within the scope of the invention that the coal tube band may be of any suitable configuration and arrangement.

[0034] Referring now to FIG. 6, a partial sectional front view of the preferred coal burner assembly 20 is illustrated. As shown in FIG. 6, the preferred coal burner assembly 20 includes air inlet 92 and a secondary fan including impeller 94. The preferred impeller 94 is mounted in housing 22 and is in fluid communication with air inlet 92 and operatively connected to motor 28. The preferred impeller 94 is adapted to direct air from air inlet 92 toward burner end 24. More particularly, the preferred impeller 94 is adapted to deliver combustion air to combustion air annulus 96. The preferred combustion air annulus 96 is defined by the space between the outer surface of coal tube 60 and the inner surface of housing 22. The preferred impeller 94 is an integral component of the coal burner, but it is contemplated within the scope of the invention that the impeller may be a separate component or part of a coal preparation system. The preferred impeller 94 is controlled by a variable speed drive, but it is contemplated within the scope of the invention that the impeller may be controlled by any suitable device. It is also contemplated within the scope of the invention that combustion air may be delivered to the coal burner assembly using more or fewer than two fans or impellers or by any other suitable device adapted to deliver air.

[0035] It is contemplated within the scope of the invention that alternative embodiments of the coal burner assembly may include a plurality of spin vanes. The preferred spin

vanes are located downstream from the impeller and upstream from the burner end. The preferred spin vanes are disposed in a radial arrangement relative to the longitudinal axis of the burner assembly and may be controlled and adjusted using a burner control system.

[0036] Referring now to FIG. 7A, a partial sectional perspective view of the preferred burner end 24 of coal burner assembly 20 is illustrated. As shown in FIG. 7A, the preferred burner end includes first bluff body ring 32, second bluff body ring 34, third bluff body ring 35, flame bridges 36, gas injection nozzles 38, atomizing nozzle 39, flame retention cone 52, cylindrical portion 54, jog 55, coal tube 60 and liquid fuel guide tube 62. FIG. 7B illustrates an enlarged view of the liquid fuel assembly shown in FIG. 7A. More particularly, as shown in FIG. 7B, the preferred coal burner assembly 20 includes igniter 98 which is mounted in burner end 24 and adapted to ignite the air and fuel mixture in the burner end to produce the main flame.

[0037] In operation, several advantages of the preferred embodiments of the invention are achieved. For example, the preferred embodiments of the coal burner assembly are adapted for use in connection with the production of hot mix asphalt. In the preferred embodiments of the coal burner assembly, pulverized coal preferably enters the coal burner assembly through a large flange in the top of the housing. The pulverized coal preferably travels initially in a direction generally perpendicular to and toward the longitudinal axis of the coal burner assembly and then in a direction generally parallel to the longitudinal axis and toward the burner end. By injecting the coal into the coal burner assembly in this manner wear to the components of the burner assembly is minimized. In addition, the preferred embodiments of the coal burner assembly do not produce a swirl within the housing. As a result, the preferred embodiments of the coal burner assembly uniformly mix air and coal dust, produce a stable main flame, and further minimize wear to the components of the burner assembly.

What is claimed is:

1. A burner assembly comprising:

- (a) a housing having an air inlet;
- (b) a burner end having an opening;
- (c) a longitudinal axis, said longitudinal axis extending generally from the air inlet toward the burner end;
- (d) a motor;
- (e) an impeller mounted in the housing, said impeller being in fluid communication with the air inlet, operatively connected to the motor and adapted to direct air from the air inlet towards the burner end;
- (f) a coal tube, said coal tube being adapted to convey coal toward the burner end;
- (g) a coal inlet, said coal inlet being adapted to convey coal to the coal tube;
- (h) a first bluff body ring, said first bluff body ring being mounted at the burner end;
- (i) a second bluff body ring, said second bluff body ring being mounted at the burner end;
- (j) a third bluff body ring, said third bluff body ring being mounted at the burner end;
- (k) at least one flame bridge; said at least one flame bridge being disposed between the first bluff body ring and the second bluff body ring; and
- (l) an igniter mounted in the burner end, said igniter being adapted to ignite the air and fuel mixture in the burner end to produce a main flame.